FACT SHEET

Drinking Water Regulations under the Safe Drinking Water Act

May 1990

Criteria and Standards Division
Office of Drinking Water
U.S. Environmental Protection Agency
Washington, D.C.

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DRINKING WATER REGULATIONS UNDER THE SDWA AMENDMENTS OF 1986

Significant directives to EPA's standard-setting program for drinking water contaminants included in the 1986 Amendments to the Safe Drinking Water Act (SDWA) are provided below.

- EPA must set Maximum Contaminant Level Goals (MCLGs) and National Primary Drinking Water Regulations (NPDWRs) for 83 specific contaminants and for any other contaminant in drinking water that may have any adverse effect upon the health of persons and which is known or anticipated to occur in public water systems.

- Recommended Maximum Contaminant Levels (RMCLs) are now termed Maximum Contaminant Level Goals (MCLGs). No changes were made in the basis of an MCLG; i.e.:

  MCLGs are non-enforceable health goals that are to be set at levels at which no known or anticipated adverse health effects occur and which allow an adequate margin of safety.

- Maximum Contaminant Levels (MCLs) must be set as close to MCLGs as is feasible. The definition of "feasible" was changed to the following:

  Feasible means with the use of the best technology, treatment techniques and other means, which the Administrator finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking costs into consideration).

  The SDWA states that Granular Activated Carbon (GAC) is feasible for the control of Synthetic Organic Chemicals (SOCs), and any technology or other means found to be the best available for control of SOCs must be at least as effective in controlling SOCs as GAC.

- MCLGs and MCLs must be proposed at the same time and also promulgated simultaneously.

- MCLGs, NPDWRs and monitoring requirements are to be set for 83 contaminants listed in the SDWA. NPDWRs can be either MCLs or treatment technique requirements. The Best Available Technology (BAT) is also to be specified for each contaminant for which an MCL is established.

  Table 1 lists the 83 contaminants required to be regulated. Seven substitutes were allowed if regulation of any seven other contaminants would be more protective of public health (see Tables 2 and 3). The substituted contaminants must be included on the drinking water priority list.

➢ The statutory timetable to produce the MCLGs and NPDWRs was as follows:

- 9 by June 19, 1987
- 40 by June 19, 1988
- 34 by June 19, 1989

➢ MCLGs, NPDWRs and monitoring requirements must be set for other contaminants in drinking water that may pose a health risk.

- The 1986 Amendments require that EPA publish a Drinking Water Priority List (DWPL) of drinking water contaminants that may require regulation under the SDWA (see Table 4).
- The list must be published by January 1, 1988, and every 3 years thereafter.
- MCLGs, NPDWRs and monitoring requirements are to be set for at least 25 contaminants on the list by January 1, 1991.
- MCLGs, NPDWRs and monitoring requirements are to be set for at least 25 contaminants every 3 years following January 1, 1991 (e.g., 1994, 1997), from subsequent triennial lists.

➢ Criteria must be established by which states must determine which surface water systems must install filtration. The SDWA deadline for promulgating this criteria was December 19, 1987. States with primary enforcement responsibility must make determinations regarding filtration within 12 months of promulgation of these criteria and must adopt regulations to implement the filtration requirements within 18 months of promulgation.

➢ A treatment technique regulation must be promulgated to require all public water systems to use disinfection.

- Variances will be available. EPA will specify variance criteria (e.g. quality of source water, protection afforded by watershed management.)
- The disinfection treatment rule must be promulgated by June 19, 1989.

➢ The 1986 Amendments banned the use of any pipe, solder, flux or fittings which are not " lead free " in a public water system or in any building connected to a public water system. Flux and solder may not have more than 0.2% lead, and pipe and fittings not more than 8% lead.

➢ Requirements must be set for water systems to monitor for unregulated contaminants.

- Minimum monitoring frequency is five years.
- States may add/delete contaminants from list.
- Requirements to monitor for unregulated contaminants must be promulgated by December 19, 1987.

➢ MCLGs/NPDWRs and monitoring requirements must be reviewed by EPA every three years.

➢ Other requirements/provisions of the 1986 Amendments:

- Public notification regulations may be changed to provide for different types and frequencies of notice depending upon the potential health risk.
- BAT for issuance of variances must be set when MCLs are set. BAT may vary depending upon the size of systems and other factors, including costs.
- Exemptions can be extended for systems with 500 service connections or less. No limit is placed on the number of extensions but certain criteria must be met.

➢ Table 5 includes a summary of deadlines pertinent to standard-setting.

➢ All current drinking water regulations, which have been promulgated as of July 1 in any year, may be found in Title 40 of the *Code of Federal Regulations* (*CFR*), , Parts 141, 142, and 143. Regulations published between *CFR* editions may be found in the *Federal Register* (*FR*).

For additional information, contact:

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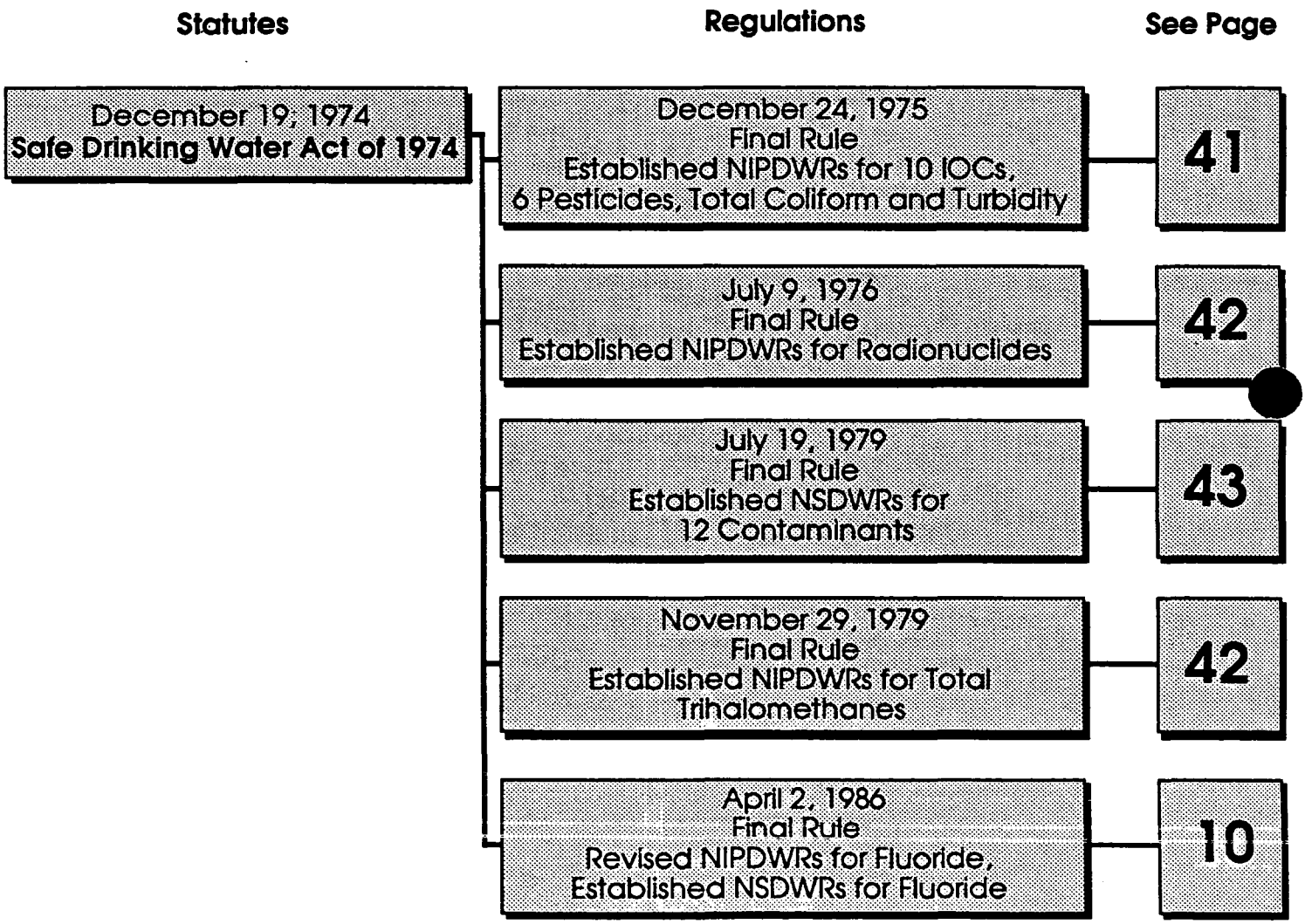
Major Statutory and Regulatory Actions of the Safe Drinking Water Act 1974 - 1986



NOTE: The National *Interim* Primary Drinking Water Regulations (NIPDWRs) became National Primary Drinking Water Regulations (NPDWRs) with passage of the Safe Drinking Water Act Amendments of 1986.

Major Statutory and Regulatory Actions of the Safe Drinking Water Act
1986 - PRESENT

Statutes	Regulations	See Page
June 19, 1986 **Safe Drinking Water Act Amendments of 1986**	July 8, 1987 8 VOCs and Unregulated VOC Monitoring	10-13
	October 28, 1987 Public Notification Requirements	14-15
	January 22, 1988 Final List of 83 and DWPL	6-8
	August 18, 1988 Proposed Rule Lead and Copper (Corrosion By-products)	26
October 31, 1988 **Lead Contamination Control Act of 1988**	May 22, 1989 Proposed Rule 38 IOCs and SOCs	27-33
	June 29, 1989 Revised NPDWRs for Total Coliform: Filtration and Disinfection Requirements	16-25
	June 1990 Expected Date of Proposal 24 IOCs and SOCs	34-35
	February 1991 Expected Date of Proposal Radionuclides	35-38
	Fall 1991 Expected Date of Proposal Disinfection By-products	38-40

Contaminants Required to be Regulated by the SDWA Amendments of 1986 and Drinking Water Priority List

- The original group of contaminants required to be regulated by the SDWA Amendments appeared in Advanced Notices of Proposed Rulemakings published in the *Federal Register* on March 4, 1982 (47 *FR* 9352) and October 5, 1983 (48 *FR* 45502).
- Final substitutes to the Drinking Water Priority List (DWPL) notice were signed by the Administrator on January 13, 1988, and published in the *Federal Register* on January 22, 1988 (53 *FR* 1892).
- Table 1 shows the List of 83 contaminants. Table 2 shows contaminants removed from the list of 83. Table 3 shows the substitutes added. Table 4 shows the DWPL.

Table 1
List of Contaminants Required to be Regulated under the SDWA Amendments of 1986

Volatile Organic Chemicals

Benzene - [0,1]	1,1-Dichloroethylene - [0,1]	Trichlorobenzene - [5]
Carbon tetrachloride - [0,1]	cis-1,2,-Dichloroethylene - [2]	1,1,1-Trichloroethane - [0,1]
Chlorobenzene - [2]	trans-1,2,Dichloroethylene - [2]	Trichloroethylene - [0,1]
Dichlorobenzene - [0,1,2]	Dichloromethane - [5]	Vinyl chloride - [0,1]
1,2,-Dichloroethane - [0,1]	Tetrachloroethylene - [2]	

Microbiology and Turbidity

Giardia lamblia - [4]	Standard plate count - [4]	Turbidity - [0,4]
Legionella - [4]	Total coliforms - [0,4]	Viruses - [4]

Inorganics

Aluminum - [×]	Copper - [*]	Nitrite - [+,2]
Antimony - [5]	Cyanide - [5]	Selenium - [0,2]
Arsenic - [0,* * *]	Fluoride - [0,* *]	Silver - [0,×,2]
Asbestos - [2]	Lead - [0,*]	Sodium - [×]
Barium - [0,2]	Mercury - [0,2]	Sulfate - [5]
Beryllium - [5]	Molybdenum - [×]	Thallium - [5]
Cadmium - [0,2]	Nickel - [5]	Vanadium - [×]
Chromium - [0,2]	Nitrate - [0,2]	Zinc - [×]

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Table 1 Cont'd

Organics

Acrylamide - [2]	Dinoseb - [5]	PCBs - [2]
Adipates - [5]	Diquat - [5]	Pentachlorophenol - [2]
Alachlor - [2]	EDB - [2]	Phthalates - [5]
Aldicarb - [2]	Endothall - [5]	Picloram - [5]
Aldicarb sulfone - [+,2]	Endrin - [0,2]	Simazine - [5]
Aldicarb sulfoxide - [+,2]	Epichlorohydrin - [2]	Styrene - [+,2]
Atrazine - [2]	Ethylbenzene - [+,2]	2,3,7,8-TCDD (Dioxin) - [5]
Carbofuran - [2]	Glyphosate - [5]	Toluene - [2]
Chlordane - [2]	Heptachlor - [+,2]	Toxaphene - [0,2]
2,4,-D - [0,2]	Heptachlor epoxide - [+,2]	2,4,5-TP - [0,2]
Dalapon - [5]	Hexachlorocyclopentadiene - [5]	1,1,2-Trichloroethane - [5]
DBCP - [2]	Lindane - [0,2]	Vydate - [5]
Dibromomethane - [×]	Methoxychlor - [0,2]	Xylene - [2]
1,2-Dichloropropane - [2]	PAHs - [5]	

Radionuclides

Beta particle and photon radioactivity - [0,3]	Radium 226 - [0,3]	Radon - [3]
Gross alpha particle activity - [0,3]	Radium 228 - [0,3]	Uranium - [3]

0	Contaminants currently regulated
1	Contaminants with MCLs and MCLGs promulgated July 8, 1987 (see **page 10 - 13**)
2	Contaminants with NPDWRs proposed on May 22, 1989 (see **page 27 - 33**)
3	Contaminants with NPDWRs scheduled for proposal in February 1991 (see **page 35-38**)
4	Contaminants with NPDWRs promulgated on June 29, 1989 (see **page 16 - 25**)
5	Contaminants with NPDWRs scheduled for proposal in June 1990 (see **page 34 - 35**)
×	Contaminants removed from the list of 83
+	Contaminants added to the list of 83
*	Contaminants with NPDWRs proposed in August 18, 1988 (see **page 26**)
* *	Fluoride final rule April 2, 1986 (see **page 10**)
* * *	Arsenic to be revised at a later date

Table 2
Removed from SDWA List of 83:

Aluminum	Molybdenum	Sodium	Zinc
Dibromomethane	Silver	Vanadium	

Table 3
Substituted into SDWA List of 83:

Aldicarb sulfone	Ethylbenzene	Heptachlor epoxide	Styrene
Aldicarb sulfoxide	Heptachlor	Nitrite	

Table 4
Drinking Water Priority List (DWPL)

Aluminum	Cryptosporidium	Hypochlorite ion
Ammonia	Cyanazine	Isophorone
Boron	Cyanogen chloride	Methyl tert-butyl ether
Bromobenzene	Dibromoacetonitrile	Metolachlor
Bromochloroacetonitrile	Dibromochloromethane	Metribuzin
Bromodichloromethane	Dibromomethane	Molybdenum
Bromoform	Dicamba	Ozone byproducts
Bromomethane	Dichloroacetonitrite	Silver
Chloramine	1,1-Dichloroethane	Sodium
Chlorate	1,3-Dichloropropane	Strontium
Chlorine	2,2-Dichloropropane	2,4,5-T
Chlorine dioxide	1,1-Dichloropropene	1,1,1,2-Tetrachloroethane
Chlorite	1,3-Dichloropropene	1,1,2,2-Tetrachloroethane
Chloroethane	2,4-Dinitrotoluene	Trichloroacetonitrile
Chloroform	ETU	1,2,3-Trichloropropane
Chloromethane	Halogenated acids,	Trifluralin
Chloropicrin	Alcohols, Aldehydes,	Vanadium
o-Chlorotoluene	Ketones, and	Zinc
p-Chlorotoluene	other Nitriles	

Table 5
Summary of Statutory Deadlines and Regulatory Actions under SDWA Amendments of 1986

What?	When?
9 MCLGs and NPDWRs/Monitoring	**June 19, 1987**
Fluoride MCLG/MCL — Final	April 2, 1986
8 VOCs MCLGs/MCLs — Final	July 8, 1987
Propose Seven Substitutes	**June 19, 1987**
7 Substitutes — Proposed	July 8, 1987
Public Notice Revisions	**Sept. 19, 1987**
PN Revisions — Final	October 28, 1987
Filtration Criteria	**Dec. 19, 1987**
Filtration & Disinfection Rule — Final	June 29, 1989
Monitoring for Unregulated Contaminants	**Dec. 19, 1987**
First Group — Final	July 8, 1987
Second Group — Proposed	May 22, 1989
First List of Contaminants (DWPL)	**January 1, 1988**
List of 83 and DWPL — Final	January 22, 1988
40 MCLGs and NPDWRs/Monitoring	**June 19, 1988**
Lead/ Copper Rule — Proposed	August 18, 1988
38 IOCs and SOCs (Phase II) — Proposed	May 22, 1989
34 MCLGs and NPDWRs/Monitoring	**June 19, 1989**
Total Coliform — Final	June 29, 1989
4 Microb. and Turbidity — Final	June 29, 1989
24 IOCs and SOCs (Phase V) — Exp. Proposal	June 1990
6 Radionuclides — Exp. Proposal	February 1991
Arsenic — Exp. Proposal	not determined
Disinfection Treatment	**June 19, 1989**
Filtration and Disinfection — Final	June 29, 1989
Ground Water Disin. — Exp. Proposal	January 1991
25 MCLGs and NPDWRs/Monitoring	**January 1, 1991**
Disinfection By-products — Exp. Proposal	September 1991

STATUS: NATIONAL PRIMARY DRINKING WATER REGULATIONS

Fluoride

- ANPRM - October 5, 1983 (48 *FR* 45502)
- Proposed MCLG - May 14, 1985 (50 *FR* 20164)
- Final MCLG, Proposed MCL, SMCL and monitoring requirements - November 14, 1985 (50 *FR* 47142)
- Final MCL, SMCL and monitoring requirements - April 2, 1986 (51 *FR* 11396)

Final MCLG	4.0 mg/l
Final MCL	4.0 mg/l
Final SMCL	2.0 mg/l
Final Monitoring	• 1 per year surface waters • 1 per 3 years ground waters • Minimum repeat : 1 per 10 years

- Three-year reassessment begun as required under the SDWA Amendments - January 3, 1990 (55 *FR* 160)

Volatile Organic Chemicals (VOCs)

- ANPRM - March 4, 1982 (47 *FR* 9350)
- Proposed MCLGs - June 12, 1984 (49 *FR* 24330)
- Final MCLGs, proposed MCLs and monitoring requirements - November 13, 1985 (50 *FR* 46880)
- Reproposed MCLG/MCL for para-dichlorobenzene - April 17, 1987 (52 *FR* 12876).
- Final rules signed by Administrator - June 19, 1987 and published in *Federal Register* on July 8, 1987 (52 *FR* 25690).
- Correction Notice, July 1, 1988 (53 *FR* 25108).

Table 6
VOCs: Final MCLGs and MCLs (in mg/l)

Chemical	Final MCLG	Final MCL
Benzene	0	0.005
Carbon Tetrachloride	0	0.005
1,2-Dichloroethane	0	0.005
1,1-Dichloroethylene	0.007	0.007
para-Dichlorobenzene	0.075	0.075
1,1,1-Trichloroethane	0.20	0.20
Trichloroethylene	0	0.005
Vinyl Chloride	0	0.002

BAT under SDWA Section 1412 (MCLs) and Section 1415 (Variances)

- ➢ Packed Tower Aeration (PTA) and Granular Activated Carbon (GAC) for the eight VOCs, except vinyl chloride.

- ➢ PTA for vinyl chloride.

Compliance Monitoring

- ➢ Initial Monitoring: All systems must monitor each source at least once within four years.

  - Surface waters: 4 quarterly samples
  - Ground waters: 4 quarterly samples; state can exempt systems from subsequent monitoring if no VOCs detected in first sample
  - Composite samples of up to five sources allowed

Table 7
Compliance Monitoring Based On System Size

Size	Begin initial monitoring by	Complete initial monitoring by
> 10,000	January 1, 1988	December 31, 1988
3,300-10,000	January 1, 1989	December 31, 1989
< 3,300	January 1, 1991	December 31, 1991

➢ Repeat monitoring: varies from quarterly to only at state discretion. The frequency is based on whether VOCs are detected in the first round of monitoring, whether system is vulnerable to contamination, size of system, and source of water.

Analytical Methods: GC or GC/MS

➢ Methods 504, 502.1, 503.1, 524.1, 524.2, 502.2

Laboratory Certification Criteria

➢ Seven VOCs: $\pm 20\%$ ≥ 0.010 mg/l
$\pm 40\%$ < 0.010 mg/l

➢ Vinyl Chloride: $\pm 40\%$

➢ Method Detection Limit: 0.0005 mg/l

Non-transient Non-community Water Systems (NTNCWS)

➢ Non-community water systems which regularly serve at least 25 of the same persons over 6 months per year (i.e., Non-Transient Non-Community Water Systems) are required to meet all requirements in this rule.

Point-of-Entry (POE), Point-of-Use (POU), and Bottled Water

➢ POE may be used to achieve compliance with MCLs but is not BAT.

➢ POU and bottled water cannot be used to meet MCLs.

Variances and Exemptions

➢ As a condition of issuing a variance or exemption, states have the authority to require the water system to implement additional interim control measures. If an unreasonable risk to health exists, the state must require either installation of POU devices or distribution of bottled water to each customer.

Monitoring for Unregulated VOCs

➢ Methodology same as for regulated VOCs.

➢ Initial monitoring: Systems must monitor each source for unregulated VOCs during a four-year period. Systems serving fewer than 150 service connections may send a letter to the state stating that the system is available for sampling.

- Surface waters: 4 quarterly samples
- Ground waters: 1 sample
- Composite samples of up to five sources allowed

➢ Same phase-in schedules as compliance monitoring.

Monitoring for Unregulated VOCs

➢ 51 VOCs specified (see Table 8):

- List 1: required for all systems (34 VOCs)
- List 2: required for vulnerable systems (2 VOCs)
- List 3: required at state discretion (15 VOCs)

➢ Repeat monitoring: Every five years; EPA will specify a new list.

Table 8
Monitoring for Unregulated VOCs

Required for all systems:

Bromobenzene	Dibromomethane	Ethylene dibromide
Bromodichloromethane	m-Dichlorobenzene	Ehylbenzene
Bromoform	o-Dichlorobenzene	Styrene
Bromomethane	Dichloromethane	1,1,1,2-Tetrachloroethane
Chlorobenzene	1,1-Dichloroethane	1,1,2,2-Tetrachloroethane
Chlorodibromomethane	cis-1,2-Dichloroethylene	Tetrachloroethylene
Chloroethane	trans-1,2-Dichloroethylene	Toluene
Chloroform	2,2-Dichloropropane	1,1,2-Trichloroethane
Chloromethane	1,2-Dichloropropane	1,2,3-Trichloropropane
o-Chlorotoluene	1,3-Dichloropropane	m-Xylene
p-Chlorotoulene	1,1-Dichloropropene	o-Xylene
1,2 Dibromo-3-chloro-propane	1,3-Dichloropropene	p-Xylene

Required for Vulnerable Systems:

1,2-Dibromo-3-chloropropane (DBCP)

Ethylene dibromide (EDB)

State Discretion:

Bromochloromethane	p-Isopropyltoluene
n-Butylbenzene	1,2,3-Trichlorobenzenenaphthalene
sec-Butylbenzene	n-Propylbenzene
tert-Butylobenzene	1,2,4-Trichlorobenzene
Dichlorodifluoromethane	1,2,4-Trimethylbenzene
Fuorotrichloromethane	1,3,5-Trimethylbenzene
Hexachlorobutadiene	1,4,5-Trimethylbenzene
Isopropylbenzene	

Public Notification

➢ EPA promulgated new regulations for public notification on October 28, 1987 (53 *FR* 41534).

Classification of Violations

➢ Tier 1 Violations are directly related to potential adverse health effects. They include:

- Failure to comply with an MCL;
- Failure to comply with a treatment technique requirement that has been established in lieu of an MCL, and
- Failure to comply with a schedule prescribed under a variance or exemption.
- Acute violations are tier 1 violations for contaminants which pose an immediate threat to human health (e.g. total coliform and nitrate).

➢ Tier 2 Violations do not pose a direct threat to public health; however, they are significant enough to warrant public notice. They include:

- Failure to comply with monitoring requirements;
- Failure to use or comply with specified test procedures; and
- Issuance of variance or an exemption.

Information Included in a Public Notice

➢ Each notice must contain the following:

- A clear and understandable explanation of the violation;
- Information about potential adverse health effects, including specific mandatory language that must be provided by all systems with Tier 1 violations and by all systems that have been issued a variance or exemption;
- Identification of the population at risk;
- An indication of the steps being taken to correct the problem;
- Information about the need for alternative water supplies, if any;
- Preventive measures to be taken until the violation is corrected;

➢ Each notice must:

- Be clear and conspicuous;
- Contain unduly technical language;
- Not contain unduly small print;
- Include the phone number of the owner, operator, or designee of the public water system; and
- Be multilingual, where appropriate.

Ways to Issue a Public Notice

➢ Public notification may be accomplished in the following ways:
- Through the local electronic media;
- In the local daily newspaper;
- By direct mail;
- In the customers' water bills;
- By hand delivery; or
- By continuous posting in a conspicuous place.

➢ Systems serving areas that do not have a daily or weekly newspaper, must provide notice by hand delivery or posting.

➢ Public water systems must provide copies of the public notification to the state.

➢ The owner or operator of the public water system is legally responsible for ensuring that all public notice requirements are met.

Timing and Frequency of Public Notice

➢ The timing of public notification is as follows:

- Within 72 hours
  1. Notice by all systems via the electronic media for Tier 1 violations; or
  2. Notices by non-community systems via hand delivery or posting for Tier 1 Acute violations

- Within 14 days
  1. Newspaper notices by all systems for all Tier 1 violations; or
  2. Notices by non-community systems by posting or hand delivery.

- Within 45 days
  1. Notices by all community water systems by direct mail, in water bills, or by hand delivery for all Tier 1 violations.

- Within 3 months
  1. Newspaper notices by all systems for Tier 2 violations; or
  2. Notices by non-community systems by posting or hand delivery for Tier 2 violations.

- Repeated every 3 months
  1. All notices given by all systems by direct mail or hand delivery for both Tier 1 and Tier 2 violations.

- Continuous notice
  1. All notices given by posting, for as long as the violation exists.

➢ All notices must be provided within the proper time limits, even if the problem has been corrected.

Surface Water Treatment Requirements

- Proposal published in Federal Register - November 3, 1987 (52 *FR* 42178)
- Notice of Availability, describing new regulatory options, published in the *Federal Register* - May 6, 1988 (53 *FR* 16348).
- Final rule promulgated - June 29, 1989 (54 *FR* 27486).

Table 9
Maximum Contaminant Level Goals

Contaminant	MCLG
Giardia Lamblia	0
Viruses	0
Legionella	0
Turbidity	none
Heterotrophic Plate Count (HPC)	none

General Requirements

- Coverage: All public water systems using any surface water or ground water under the direct influence of surface water must disinfect, and may be required by the state to filter, unless certain water quality source requirements and site specific conditions are met.
- Treatment technique requirements are established in lieu of MCLs for *Giardia*, viruses, heterotrophic plate count bacteria, *Legionella* and turbidity.
- Treatment must achieve at least 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts and 99.99 percent removal and/or inactivation of viruses.
- All systems must be operated by qualified operators as determined by the state.

Criteria to be Met to Avoid Filtration

Source Water Criteria

- Fecal coliform concentration must not exceed 20/100 ml or the total coliform concentration must not exceed 100/100 ml before disinfection in more than ten percent of the measurements for the previous six months, calculated each month.

Table 10
Minimum Sampling Frequencies for Total or Fecal Coliform

System size (persons)	Samples / Week
< 501	1
501-3,300	2
3,301-10,000	3
10,001-25,000	4
> 25,000	5

- If not already conducted under the above requirements, a coliform test must be made each day that the turbidity exceeds 1 NTU.

- Turbidity levels must be measured every four hours by grab sample or continuous monitoring. The turbidity level may not exceed 5 NTU. If the turbidity exceeds 5 NTU, the system must install filtration unless the state determines that the event is unusual or unpredictable, and the event does not occur more than twice in any one year, or five times in any consecutive ten years. An "event" is one or more consecutive days when at least one turbidity measurement each day exceeds 5 NTU.

Site Specific Conditions

Disinfection

- Disinfection must achieve at least a 99.9 and 99.99 percent inactivation of *Giardia* cysts and viruses, respectively. This must be demonstrated by the system meeting "CT" values in the rule ("CT" is the product of residual concentration (mg/l) and contact time (minutes) measured at peak hourly flow). Failure to meet this requirement on more than one day in a month is a violation. Filtration is required if a system has two or more violations in a year unless the state determines that the violation(s) were caused by unusual and unpredictable circumstances; regardless of such determinations by the state, the system must filter if there are three or more violations in a year.

- Disinfection systems must have redundant componentsor ,if approved by the state, automatic water delivery shut-off.

- Disinfectant residuals in the distribution system cannot be undetectable or HPC levels cannot be greater than 500/ml in more than five percent of the samples, each month, for any two consecutive months. Samples must be taken at the same frequency as total coliforms under the revised Coliform Rule. Systems in violation of this requirement must install filtration unless the state determines that the violation is not caused by a deficiency of treatment of the source water.

- Systems must maintain a disinfectant residual concentration of at least 0.2 mg/l in the water entering the system, demonstrated by continuous monitoring. If there is a failure in the continuous monitoring, the system may substitute grab sample monitoring every four hours for up to five days. If the disinfectant residual falls below 0.2 mg/l, the system must notify the state as soon as possible but no later than the end of the next business day. If the residual is not restored to at least 0.2 mg/l within four hours, it is a violation and the system must filter, unless the state determines that the violation was caused by unusual and unpredictable circumstances. Systems serving 3300 people or less can take daily grab samples in lieu of continuous monitoring. Minimum grab sampling frequencies are: 1/day < 501 people; 2/day 501 - 1000 people; 3/day 1001 - 2500 people; 4/day 2501 - 3300 people. If at any time the residual is below 0.2 mg/l, the system must conduct grab sample monitoring every four hours until the residual is restored.

Other Conditions

- Systems must maintain an adequate watershed control program, as determined by the state, which will minimize the potential for contamination by human enteric viruses and *Giardia lamblia* cysts.

- Systems must not have had any waterborne disease outbreaks, or if they have, such systems must have been modified to prevent another such occurrence, as determined by the state.

- Systems must not be out of compliance with the monthly MCL for total coliforms for any two months in any consecutive 12 month period, unless the state determines that the violations are not due to treatment deficiency of the source water.

- Systems serving more than 10,000 people must be in compliance with MCL requirements for total trihalomethanes.

Criteria for Filtered Systems

Turbidity Monitoring

- Turbidity must be measured every four hours by grab sample or continuous monitoring. For systems using slow sand filtration or filtration technologies other than conventional treatment, direct filtration or diatomaceous earth filtration, the state may reduce the sampling frequency to once per day. The state may reduce monitoring to one grab sample per day for all systems serving less than 500 people.

Turbidity Removal

- Conventional filtration or direct filtration must achieve a turbidity level in the filtered water at all times less than 5 NTU and not more than 0.5 NTU in more than five percent of the measurements taken each month. The state may increase the 0.5 NTU limit up to less than 1 NTU in greater than or equal to 95 percent of the measurements, without any demonstration by the system, if it determines that overall treatment with disinfection achieves at least 99.9 percent and 99.99 percent removal/inactivation of *Giardia* cysts and viruses, respectively.

- Slow sand filtration must achieve a turbidity level in the filtered water at all times less than 5 NTU and not more than 1 NTU in more than five percent of the samples taken each month. The turbidity limit of 1 NTU may be increased by the state (but at no time exceed 5 NTU) if it determines that there is no significant interference with disinfection.

- Diatomaceous earth filtration must achieve a turbidity level in the filtered water at all times less than 5 NTU and of not more than 1 NTU in more than five percent of the samples taken each month.

- Other filtration technologies may be used if the system demonstrates to the state that they achieve at least 99.9 and 99.99 percent removal/inactivation of *Giardia lamblia* cysts and viruses, respectively, and are approved by the state. Turbidity limits for these technologies are the same as those for slow sand filtration, including the allowance of increasing the turbidity limit of 1 NTU up to 5 NTU, but at no time exceeding 5 NTU upon approval by the state.

Disinfection Requirements

- Disinfection with filtration must achieve at least 99.9 and 99.99 percent removal/inactivation of *Giardia* cysts and viruses, respectively. The states define the level of disinfection required, depending on technology and source water quality. Disinfection requirements for point of entry to the distribution system and within the distribution system are the same as for unfiltered systems.

Analytical Requirements

- Except for ozone, testing and sampling must be in accordance with Standard Methods, 16th edition, or methods approved by EPA for total coliforms, fecal coliform, turbidity, disinfectant residuals, temperature, and pH. Residual disinfectant concentrations for ozone must be measured by the Indigo Method or automated methods which are calibrated in reference to the results obtained by the Indigo Method.

Reporting

- All parameters required in the rule must be reported monthly to the state. Unfiltered water systems must also report annually on their watershed control program and on-site inspections.

Compliance

Surface Water Systems

- Unfiltered systems must meet monitoring requirements by December 31, 1990, unless the state has determined that filtration is required. Unfiltered systems must meet the criteria to avoid filtration by December 31, 1991, unless the state has determined that filtration is required. Unfiltered systems must install filtration within 18 months following the failure to meet any one of the criteria to avoid filtration, or by June 29, 1993, whichever is later.

- Filtered systems must meet monitoring and performance requirements beginning June 29, 1993.

- The interim turbidity monitoring and MCL requirements will remain in effect for unfiltered systems until December 31, 1991, and for filtered systems until June 29, 1993. For systems which the state determines must filter, the interim turbidity requirements will remain in effect until June 29, 1993, or until filtration is installed, whichever is later.

Ground Water Systems Under Direct Influence of Surface Water

- All systems using ground water under direct influence of surface water must meet the treatment requirements under the SWTR. States must determine which community and non-community ground water systems are under direct influence of surface water by June 29, 1994 and June 29, 1999, respectively.

Variances

- Variances are not applicable.

Exemptions

- Exemptions are allowed for the requirement to filter. Systems using surface water must disinfect (i.e., no exemptions). Exemptions are allowed for the level of disinfection required.

Total Coliforms

- Proposal was published in the *Federal Register* - November 3, 1987 (52 FR 42224).

- Additional regulatory options were published in the *Federal Register* - May 6, 1988 (53 FR 16340).

- Final rule promulgated - June 29, 1989 (54 *FR* 27544).

Effective date

- December 31,1990

Maximum Contaminant Level Goal

- Zero

Maximum Contaminant Level

- Compliance is based on presence/absence of total coliforms in sample, rather than on an estimate of coliform density.
- MCL for systems analyzing at least 40 samples/month: no more than 5.0 percent of the monthly samples may be total coliform-positive.
- MCL for systems analyzing less than 40 samples/month: no more than 1 sample/month may be total coliform-positive.

Monitoring Requirements for Total Coliforms

- Required written sample siting plan, subject to state review and revision.
- Monthly monitoring requirements based on population served (see Table 11).
- A system must collect a set of repeat samples for each total coliform-positive routine sample (see Table 12) and have it analyzed for total coliforms. The system must collect all repeat samples within 24 hours of being notified of the original result, except where the state waives this requirement.
- If total coliforms are detected in any repeat sample, the system must collect another set of repeat samples unless the MCL has been violated and the system has notified the state.
- Systems collecting fewer than five routine samples/month and detecting total coliforms in any routine or repeat sample must collect five routine samples the next month the system provides water to the public, unless the state waives this requirement.
- Unfiltered surface water systems, or systems using unfiltered ground water under the direct influence of surface water, must analyze one coliform sample each day the turbidity of the source water exceeds 1 NTU.
- Tables 11 and 12 summarize the routine and repeat sample monitoring requirements for total coliforms.

Table 11
Total Coliform Sampling Requirements According to Population Served

Population Served	Minimum No. of Routine Samples Per Month[1]	Population Served	Minimum No. of Routine Samples Per Month
25 to 1,000[2]	1[3]	59,001 to 70,000	70
1,001 to 2,500	2	70,001 to 83,000	80
2,501 to 3,300	3	83,001 to 96,000	90
3,301 to 4,100	4	96,001 to 130,000	100
4,101 to 4,900	5	130,001 to 220,000	120
4,901 to 5,800	6	220,001 to 320,000	150
5,801 to 6,700	7	320,001 to 450,000	180
6,701 to 7,600	8	450,001 to 600,000	210
7,601 to 8,500	9	600,001 to 780,000	240
8,501 to 12,900	10	780,001 to 970,000	270
12,901 to 17,200	15	970,001 to 1,230,000	300
17,201 to 21,500	20	1,230,001 to 1,520,000	330
21,501 to 25,000	25	1,520,001 to 1,850,000	360
25,001 to 33,000	30	1,850,001 to 2,270,000	390
33,001 to 41,000	40	2,270,001 to 3,020,000	420
41,001 to 50,000	50	3,020,001 to 3,960,000	450
50,001 to 59,000	60	3,960,001 or more	480

[1] In lieu of the frequency specified, a Non-CommunityWater System (NCWS) using ground water and serving 1,000 persons or fewer may monitor at a lesser frequency specified by the state until a sanitary survey is conducted and reviewed by the state. Thereafter, NCWSs using ground water and serving 1000 persons or fewer must monitor in each calendar quarter during which the system provides water to the public, unless the state determines that some other frequency is more appropriate and notifies the system (in writing). Five years after promulgation, NCWSs using ground water and serving 1,000 persons or fewer must monitor at least once/year.

A NCWS using surface water, or ground water under the direct influence of surface water, regardless of the number of persons served, must monitor at the same frequency as a like-sized Community Water System (CWS). A NCWS using ground water and serving more than 1,000 persons during any month must monitor at the same frequency as a like-sized CWS, except that the state may reduce the monitoring frequency for any month the system serves 1,000 persons or fewer.

[2] Includes public water systems which have at least 15 service connections, but serve fewer than 25 persons.

[3] For a CWS serving 25-1,000 persons, the state may reduce this sampling frequency, if a sanitary survey conducted in the last five years indicates that the water system is supplied solely by a protected ground-water source and is free of sanitary defects. However, in no case may the state reduce the frequency to less than once/quarter.

Table 12
Monitoring and Repeat Sample Frequency After a Total Coliform-Positive Routine Sample

No. Routine Samples/Month	No. Repeat Samples[1]	No. Routine Samples Next Month[2]
1/mo or fewer	4	5/mo
2/mo	3	5/mo
3/mo	3	5/mo
4/mo	3	5/mo
5/mo or greater	3	Table 11

[1] Number of repeat samples in the same month for each total coliform-positive routine sample.

[2] Except where state has invalidated the original routine sample, or where state substitutes an on-site evaluation of the problem, or where the state waives the requirement on a case-by-case basis.

Invalidation of Total Coliform Positive Samples

- All total coliform-positive samples count in compliance calculations, except for those samples which are invalidated by the state. Invalidated samples do not count toward the minimum monitoring frequency.

- A state may invalidate a sample only if: (1) the analytical laboratory acknowledges that improper sample analysis caused the positive result; (2) the system determines that the contamination is a domestic or other non-distribution system plumbing problem; or (3) the state has substantial grounds to believe that a total coliform-positive result is due to some circumstance or condition not related to the quality of drinking water in the distribution system, if (a) this judgment is explained in writing, (b) the document is signed by the supervisor of the state official who draws this conclusion, and (c) the documentation is made available to EPA and the public.

Variances and Exemptions: none allowed

Sanitary Surveys

- Periodic sanitary surveys are required for all systems collecting fewer than five samples /month , according to the schedule in Table 13.

Table 13
Sanitary Survey Frequency for Public Water Systems Collecting Fewer Than Five Samples/Month

System Type	Initial Survey Completed	Frequency of Subsequent Surveys
Community water system	5 years after promulgation	every 5 years
Non-community water system	10 years after promulgation	every 5 years*

* For a non-community water system which uses protected and disinfected ground water, the sanitary survey may be repeated every ten years instead of every five years.

Fecal coliforms/*E. coli*; Heterotrophic Bacteria (HPC)

- If any routine or repeat sample is total coliform-positive, the system must also analyze that total coliform-positive culture to determine if fecal coliforms or *E. Coli* are present. If fecal coliforms or *E. coli* are detected, the system must notify the state before the end of the same business day, or, if detected after the close of business for the state, by the end of the next business day.

- If any repeat sample is fecal coliform- or *E. coli*-positive, or if a fecal coliform- or *E. coli*-positive original sample is followed by a total coliform-positive repeat sample, and the original total coliform-positive sample is not invalidated, it is an acute violation of the MCL for total coliforms.

- The state has the discretion to allow a water system, on a case-by-case basis, to forgo fecal coliform or *E. coli* testing on total coliform-positive samples, if the system complies with all sections of the rule that apply when a sample is fecal coliform-positive.

- State invalidation of the routine total coliform-positive sample invalidates subsequent fecal coliform or *E. coli*-positive results on the same sample.

- Heterotrophic bacteria can interfere with total coliform analysis. Therefore, if the total coliform sample produces: (1) a turbid culture in the absence of gas production using the Multiple Tube Fermentation (MTF) Technique; (2) a turbid culture in the absence of an acid reaction using the Presence-Absence (P-A) Coliform Test; or (3) confluent growth or a colony number that is "too numerous to count" using the Membrane Filter (MF) Technique, the sample is invalid (unless total coliforms are detected, in which case the sample is valid). The system must collect another sample within 24 hours of being notified of the result from the same location as the original sample and have it analyzed for total coliforms.

Analytical Methodology

- Total coliform analyses are to be conducted using the 10-tube MTF Technique, the MF Technique, the P-A Coliform Test, or the Minimal Media ONPG-MUG Test (Autoanalysis Colilert System). The system may also use the 5-tube MTF Technique (20-ml sample portions) or a single culture bottle containing the MTF medium, as long as a 100-ml water sample is used in the analysis.

- A 100-ml standard sample volume must be used in analyzing for total coliforms, regardless of the analytical method used.

STATUS: PROPOSED NATIONAL PRIMARY DRINKING WATER REGULATIONS

Lead and Copper

- ANPRM - October 5, 1983 (48 *FR* 45502)
- Proposed MCLGs - November 13, 1985 (50 *FR* 46936)
- Reproposed MCLGs and proposed MCLs and treatment technique requirements - August 18, 1988. (53 *FR* 31516)
- Final rule expected - December 1990.

Proposed MCLGs and MCLs

- MCLs measured as water enters the distribution system, after any treatment.

Table 14
MCLGs and MCLs for Lead and Copper

Chemical	Existing MCL	Proposed MCLG	Proposed MCL
Lead	0.05 mg/l	0	0.005 mg/l
Copper	*	1.3 mg/l	1.3 mg/l

* A secondary standard of 1 mg/l is currently in effect.

Proposed Treatment Technique

- Corrosion control treatment to minimize lead and copper at the tap and public education.

Corrosion Control Triggered When:

- Average lead level in targeted samples exceeds 0.010 mg/l (measured at the tap for water standing between eight and 18 hours or,
- pH in more than 5% of samples is less than 8.0 or,
- Copper in more than 5% of samples exceeds 1.3 mg/l.

Public Education Triggered When:

- Lead level average exceeds .010 mg/l or,
- Lead levels in more than 5% of targeted samples exceed 0.020 mg/l.

Phase II - 38 Inorganic and Synthetic Organic Chemicals

- ANPRM - October 5, 1983 (48 *FR* 45502)
- Proposed MCLGs - November 13, 1985 (50 *FR* 46936)
- Reproposed MCLGs, proposed MCLs and monitoring requirements- May 22, 1989 (54 *FR* 22062)
- Close of public comment period - August 21, 1989
- Projected promulgation - December 1990.

Summary of the Proposed Rulemaking

- The May 1989 proposed rulemaking requests comments on MCLGs and MCLs for 30 Synthetic Organic Chemicals (SOCs) and eight Inorganic Chemicals (IOCs) (Table 15). The proposed rulemaking also includes monitoring, reporting, and public notification requirements for the SOCs and IOCs. For two contaminants, epichlorohydrin and acrylamide, EPA proposes a treatment technique requirement in lieu of an MCL and monitoring requirements. In addition, the Notice also proposes BAT upon which the MCLs are based and BAT for the purpose of issuing variances. Lastly, the proposal contains SMCLs for nine contaminants and monitoring requirements for approximately 110 additional "unregulated" contaminants. Upon publication of final regulations, the new monitoring requirements would be effective within 30 days; the MCLs and MCLGs would be effective 18 months after final publication.

Monitoring Requirements

Inorganics

Barium, Cadmium, Chromium,Mercury, Selenium

- Currently, all community ground water systems must monitor for inorganic contaminants every three years. Surface water systems must monitor annually. EPA proposes to retain these basic requirements. The major changes EPA proposes to the current requirements are to expand the requirements to non-transient systems and to allow monitoring at up to ten-year intervals after the system completes three rounds of sampling which show that the water consistently meets the MCLs.

Nitrate/Nitrite

- Under present EPA regulations, all community ground water systems must monitor for nitrate every three years; community surface water systems must monitor annually. Non-transient and transient systems must monitor at the discretion of the state.

- Because nitrate/nitrite contamination is associated with an acute health effect (methemoglobinemia), EPA proposes to increase the monitoring frequency for community and Non-Transient Non-Community (NTNC) systems to monitor annually for ground water systems and quarterly for surface water systems. Community and NTNC ground water systems must monitor quarterly if four consecutive samples are greater than 50% of the MCL (5 mg/L for nitrate or 0.5 mg/L for nitrite); a community or NTNC surface water system may decrease its monitoring frequency to annually if four consecutive samples are less than 50% of the MCL. Transient non-community ground water systems must monitor every three years; those served by surface water must monitor once every year. All water systems must monitor at the time of highest vulnerability.

Asbestos

- EPA proposes to require community and non-transient systems to monitor for asbestos, if a state vulnerability assessment determines that the system is vulnerable to contamination from the water source or corrosion of asbestos-cement pipe. Vulnerable systems have five years after the rules are promulgated to complete the initial monitoring. Vulnerable surface water systems must take repeat samples annually; ground water systems must take repeat samples every three years. Non-vulnerable systems are not required to monitor.

Volatile Organics

- EPA established monitoring requirements for eight solvents in 1987. These requirements require community and non-transient systems to monitor quarterly for one year. Repeat sampling frequency requirements depend on detection of contaminants and the results of a vulnerability assessment. The May 1989 proposal would add 10 additional contaminants to the list of eight solvents previously regulated by EPA in 1987.

Pesticides / Herbicides / PCBs

- Currently, community surface water systems must monitor every three years for six pesticides; pesticide monitoring for ground water systems is at state discretion. EPA proposes new monitoring requirements for 5 currently regulated and 13 additional pesticides/herbicides/PCBs (endrin, which is currently regulated, is not included in the May proposal). Community and non-transient water systems must monitor if the state determines they are vulnerable to contamination based upon an assessment. Systems found "not vulnerable" are not required to monitor. Systems determined as vulnerable must monitor quarterly for one year. Each sample must be taken at the time of the quarter the system is most vulnerable. Repeat sampling frequencies vary based on system size and whether pesticides/herbicides/PCBs are detected.

Water Treatment Chemicals

- Acrylamide and epichlorohydrin are primarily used in flocculants during water treatment to decrease turbidity. EPA proposes treatment technique requirements that limit the concentration of acrylamide and epichlorohydrin in polymers and the dose. Systems must annually certify to the state that the required levels are met.

Unregulated Contaminants

➢ EPA proposes to establish two priority lists of contaminants. Monitoring for the 29 priority #1 contaminants is dependent upon a state vulnerability assessment. Monitoring for the 84 priority #2 contaminants is at state discretion.

Best Available Technology

➢ EPA has identified BAT to remove each contaminant listed. Table 16 lists the proposed BAT for each contaminant. Systems can use BAT to comply with the MCLs and/or qualify for a variance.

Variances and Exemptions

➢ A state with primary enforcement authority may issue a variance if it determines that a system cannot comply with an MCL despite application of BAT. EPA or a state may not issue a variance or exemption if an unreasonable risk to health exists. EPA will at a later date provide guidance on how to determine the unreasonable risk to health levels for each contaminant. Before granting a variance or exemption, EPA or the state can require public water systems to provide POU devices, bottled water, or other means to reduce exposure below Unreasonable-Risk-To-Health (URTH) values.

State Implementation

➢ The proposal describes the regulations and other procedures/policies the states must adopt to implement the proposed rule. These include:

State Primacy Requirements

➢ Vulnerability assessment procedures.

➢ Procedures to reduce system monitoring frequencies.

State Recordkeeping Requirements

➢ Vulnerability assessments.

➢ Asbestos and unregulated contaminant determinations.

➢ Acrylamide and epichlorohydrin certifications.

➢ Reduced monitoring frequency determinations.

➢ Letters from small systems available for monitoring.

State Reporting Requirements

- List of systems which have:
  (1) a vulnerability assessment,
  (2) the state reduced monitoring frequencies,
  (3) certified compliance with acrylamide andepichlorohydrin, and
  (4) systems available for monitoring.

- Results of unregulated contaminant monitoring.

Table 15
Proposed National Primary Drinking Water Regulations for 38 Inorganic and Synthetic Organic Contaminants

Contaminant	Prop. MCLG (mg/l)	Current MCL (mg/l)	Prop. MCL (mg/l)
Inoganics			
Asbestos	7MFL[1]	—	7MFL[1]
Barium	5	1	5
Cadmium	0.005	0.01	0.005
Chromium	0.1	0.05	0.1
Mercury	0.002	0.002	0.002
Nitrate[2]	10	10	10
Nitrite[2]	1	—	1
Selenium	0.05	0.01	0.05
Silver	—	0.05	[3]
Volatile Organics			
o-Dichlorobenzene	0.6	—	0.6
cis-1,2-Dichloroethylene	0.07	—	0.07
trans-1,2-Dichloroethylene	0.1	—	0.1
1,2,-Dichloropropane	0	—	0.005
Ethylbenzene	0.7	—	0.7
Monochlorobenzene	0.1	—	0.1
Styrene	0/0.1	—	0.005/0.1
Tetrachloroethylene	0	—	0.005
Toluene	2	—	2
Xylenes	10	—	10

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Table 15 (Cont'd)

Proposed National Primary Drinking Water Regulations for 38 Inorganic and Synthetic Organic Contaminants

Contaminant	Prop.. MCLG (mg/l)	Current MCL (mg/l)	Prop. MCL (mg/l)
Pesticides / PCBS			
Alachlor	0	—	0.002
Aldicarb	0.01	—	0.01
Aldicarb sulfoxide	0.01	—	0.01
Aldicarb sulfone	0.04	—	0.04
Atrazine	0.003	—	0.003
Carbofuran	0.04	—	0.04
Chlordane	0	—	0.002
2,4-D	0.07	0.1	0.07
Dibromochloropropane	0	—	0.0002
Ethylene dibromide	0	—	0.00005
Heptachlor	0	—	0.0004
Heptachlor epoxide	0	—	0.0002
Lindane	0.0002	0.004	0.0002
Methoxychlor	0.4	0.1	0.4
PCBs	0	—	0.0005
Pentachlorophenol	0.2	—	0.2
Toxaphene	0	0.005	0.005
2,4,5-TP (Silvex)	0.05	0.01	0.05
Water Treatment Chemicals			
Acrylamide	0	—	TT[4]
Epichlorohydrin	0	—	TT[4]

[1] MFL = Million Fibers per Liter longer than 10 um
[2] The MCLG and MCL for total nitrate and nitrite is 10 mg/l (as N)
[3] Deleted as primary regulation; proposed as secondary
[4] TT = treatment technique requirement

Table 16
Proposed Best Available Technologies (BAT) for 38 Inorganic and Synthetic Organic Contaminants

Contaminant	Proposed BAT
Inorganics	
Asbestos	C/F; DF; DMF; CC
Barium	IE; LS; RO
Cadmium	IE; RO; C/F; LS
Chromium	C/F; IE; LS; RO
Mercury	GAC; LS; C/F; RO; PAC
Nitrate	IE; RO
Nitrite	IE; RO
Selenium	AA; LS; C/F; RO
(Note: C/F and LS not proposed for small systems serving 500 or fewer people.)	
Volatile Organics	
All VOCs	PTA; GAC
Pesticides / PCBs	
All Pesticides / PCBs	GAC
Water Treatment Chemicals	
Acrylamide	PAP
Epichlorohydrin	PAP

Best Available Technology Key:

AA = Activated Alumina	IE = Ion Exchange
CC = Corrosion Control	LS = Lime Softening
C/F = Coagulation / Filtration	PAC = Powdered Activated Carbon
DF =Direct Filtration	PAP = Polymer Addition Practices
DMF = Diatomite Filtration	PTA = Packed Tower Aeration
GAC = Granular Activated Carbon	RO = Reverse Osmosis

National Secondary Drinking Water Regulations

- In addition to the National Primary Drinking Water Regulations proposed for the 38 IOCs and SOCs on May 22, 1989, nine National Secondary Drinking Water Regulations were proposed.

- Table 17 lists the SMCLs proposed on May 22, 1989.

Table 17
Proposed SMCLs

Contaminant	Level (mg/l)
Aluminum	0.05
o-Dichlorobenzene	0.01
p-Dichlorobenzene	0.005
Ethylbenzene	0.03
Pentachlorophenol	0.03
Silver	0.09
Styrene	0.01
Toluene	0.04
Xylene	0.02

SCHEDULED NATIONAL PRIMARY DRINKING WATER REGULATIONS (To be proposed)

Phase V: 24 Inorganic and Synthetic Organic Chemicals

➢ The publication of the Notice of Proposed Rulemaking in the *Federal Register* is presently scheduled for June 1990.

Table 18
Tentative MCLGs, MCLs and Carcinogenicity Classifications

Contaminant	MCLG (mg/l)	MCL (mg/l)	Carcinogenicity Classification
Inorganic Chemicals			
Antimony	0.003	0.01/0.005*	D
Beryllium	0	0.001	B2
Cyanide	0.2	0.2	D
Nickel	0.1	0.1	D**
Sulfate	400/500	400/500	D
Thallium	0.0005	0.002/0.001*	D

* EPA proposes two MCLs based upon PQLs of five times the MDL or ten times the MDL

** EPA has classified nickel in Group A, human carcinogen, based upon inhalation data. However, EPA is regulating nickel for drinking water purposes as if it were in Group D, since there is no evidence of cancer from ingestion exposure.

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Table 18 Cont'd

Contaminant	MCLG (mg/l)	MCL (mg/l)	Carcinogenicity Classification
Organic Chemicals			
Dalapon	0.2	0.2	D
Di(ethylhexyl)adipate	0.5	0.5	C
Di(ethylhexyl)phthalate	0	0.004	B2
Dichloromethane	0	0.005	B2
Dinoseb	0.007	0.007	D
Diquat	0.02	0.02	D
Endothall	0.1	0.1	D
Endrin	0.002	0.002	D
Glyphosate	0.7	0.7	D
Hexachlorobenzene	0	0.001	B2
Hexachlorocyclopentadiene	0.05	0.05	D
Oxamyl (vydate)	0.2	0.2	E
PAHs [Benzo(a)pyrene]	0 ***	0.0002	B2
Picloram	0.5	0.5	D
Simazine	0.001	0.001	C
1,2,4-Trichlorobenzene	0.009	0.009	D
1,1,2-Trichloroethane	0.003	0.005	C
2,3,7,8-TCDD	0	5×10^{-8}	B2

*** EPA also proposes establishment of MCLGs and MCLs for six additional PAHs classified as B2, probable human carcinogens: benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indenopyrene.

Radionuclides

➢ The publication of the Notice of Proposed Rulemaking in the *Federal Register* is presently scheduled for February 1991.

Scope

➢ The NPRM is expected to propose MCLGs, MCLs, BATs for setting MCLs and as conditions for receiving variances, other criteria for receiving variances and exemptions, and monitoring requirements for the following radioactive analytes; radon-222, radium-226, radium-228, natural uranium, and beta particle and photon emitters. The proposal will also consider an MCL for alpha emitters and the measurement of gross alpha as a screening level for the regulated alpha emitters.

MCLGs: Health Effects

- All radionuclides considered in this proposal have been determined to be Group A, known human carcinogens. Therefore, the MCLG for each radionuclide will be proposed as zero. For uranium, the non-cancer endpoints of toxicity are also of concern.

- Natural uranium (non-cancer effects)— Based on physiological parameters for adults, ODW has estimated that a level of 40 pCi/L is protective of uranium's chemotoxic effects to the kidney. Physiological parameters for children might be used to derive a value of 20 pCi/L. This issue is not yet resolved.

- Radon-222(cancer effects)— Quantitative estimates of the lung cancer risks from radon volatilized from drinking water were derived from the BIER IV and IRCP 50 reports. The 10^{-6} and 10^{-4} lifetime risk range of 2 to 200 pCi/L represents the arithmetic mean of adjusted BIER IV and ICRP 50 estimates. Risk of stomach tumors from ingestion of radon are expected to be much lower than the risk from inhaled radon and are not included in this risk estimate. An estimate of stomach cancer risk is being generated.

- Uranium and radium(cancer effects)— Quantitive estimates of the lifetime risks from exposure to these elements are derived using the Radrisk model, a modification of the ICRP methodology. The 10^{-4} levels for the different isotopes of these elements are similar, ranging from 20 to 40 pCi/L. The BIER IV committee derived similar cancer risk estimates for these elements based on the increased incidence of cancer among radium workers.

- Beta (cancer effects) — No major changes from the ANPRM (51 *FR* 34836), September 30, 1986) are expected in the cancer risk estimates for beta and photon emitters. In late 1989, the BIER V committee is expected to publish a report reevaluating the atom bomb survivor data. Adjustment to the cancer estimates may then be appropriate.

MCLs

- Radon — The Agency is considering options that fall in the range of 200 to 2000 pCi/L (water). This range is equivalent to 0.02 to 0.2 pCi/L (air), assuming a transfer ratio of 10,000:1 from all of the water in the house (i.e., showers, laundry, etc).

- Radium-226 and radium-228 — A separate MCL may be proposed for each of these isotopes. For each isotope, MCLs under consideration range from 2-20 pCi/L.

- Uranium — The range of MCL options under consideration is 5 to 40 pCi/L. The mass to activity conversion factor in drinking water may be 1.3 ug/pCi, based on isotopic concentrations of natural uranium in drinking water.

- Beta particle and photon emitters — Concentrations equal to the risk posed by 4 mrem effective dose equivalent will most likely be proposed again with a request for comment.

- Gross alpha — The Agency is assessing the value of a total alpha MCL and the use of a gross alpha measurement as a monitoring screen for regulated alphas. Some analysis indicates that the current analytical method for gross alpha is not a good indicator of the activity level of the total alphas and that this method does not give an acceptable correlation between gross alpha and the regulated alpha emitters. The Agency is investigating another method for gross alpha measurement and may take comments on the use of gross alpha at proposal.

Monitoring

- Compliance likely will be proposed to be determined on quarterly samples taken over one year. The primacy state, with concurrence from the EPA region, may allow monitoring data collected within the last three years and that meet specific precision and accuracy requirements to substitute for quarterly samples.

Vulnerability

- States would determine monitoring requirements for beta particle and photon emitters based on vulnerability. Factors that should be considered are: 1) proximity to radioactive waste sites, underground testing, and facilities involved with radionuclides (e.g., nuclear power plant and other reactors); or 2) whether discharge monitoring information is provided.

Best Available Technologies for MCLs

- Radon: Aeration (GAC)
- Radium-226: Cation exchange; lime softening; reverse osmosis
- Radium-228: Cation exchange; lime softening; reverse osmosis
- Uranium: Coagulation/filtration; reverse osmosis; anion exchange; lime softening
- Betas: Reverse osmosis; ion exchange (mixed bed)

Best Available Technologies for Variances

- Reverse osmosis and ion exchange are likely to be BAT for uranium and radium for small systems. Coagulation/filtration and lime softening may be excluded as BATs for variances, due to feasibility considerations for small systems. Aeration will be BAT for radon for small systems.

Analytical Methods

- Radon: Liquid Scintillation Counting; Lucas Cell Method.
- Radium-226: Alpha Emitting Radium Isotopes in Drinking Water (Method 903.0);Radium-226 by Radon Emanation (Method 903.1); Radium-226(Method 305);Total Radium (Method 304).*
- Radium-228: Liquid Scintillation Counting(Method 904.1).**
- Uranium: Radiochemical Method 908; Fluorometric Method 908.1.
- Betas: Gross Alpha and Gross Beta Activity in Drinking Water (Method 900);Gross Beta Particle Activity(Method D-1890).
- Gross alpha: Gross Alpha in Drinking Water by Co-precipitation.

* Methods presently under review.

** It has not yet been determined if this method will be proposed; method presently under review.

Disinfectants and Disinfection By-Products

- In 1979 EPA established an interim primary MCL for Total Trihalomethanes (TTHMs) of 0.1 mg/l (44 *FR* 68624; November 29, 1979).
- Total THMs include chloroform, bromoform, bromodichloromethane and dibromochloromethane.
- EPA is preparing a disinfection treatment rule for ground waters and a rule for disinfectants and disinfection by-products. Proposal is planned for 1991. Promulgation is planned for 1992.
- Disinfectants and by-products were included on the Drinking Water Priority List (53 *FR* 1892); January 22, 1988.

➢ A preliminary concept paper was presented at a public meeting on December 4, 1989. The key points of the preliminary concept paper are as follows:

A) MCLs for the following:

1. Lead option:

   a. Total trihalomethanes (TTHMs)
   b. Haloacetic acids
   c. Chlorine dioxide, chlorite, chlorate
   d. Chlorine and chloramine

2. Potential add-ons:

   a. Chloropicrin
   b. Cyanogen chloride
   c. Hydrogen peroxide, bromate, iodate
   d. Formaldehyde

B) Set treatment technique requirements or provide guidance for the following:

1. MX (as a surrogate for mutagenicity).

2. Total oxidizing substances (as a surrogate for organic peroxides and epoxides).

3. Assimillable Organic Carbon (AOC) (as a surrogate for microbiological quality of oxidized waters).

C) Require monitoring:

1. Segmented by the treatment process used (see Table 19).

2. Reduce monitoring requirements to one per quarter at system discretion; one per year at state discretion based on system history.

D) List Best Available Technologies:

1. Precursor removal (50% removal of TTHM-formation potential) using:

   a. Conventional treatment modifications.

   b. Granular Activated Carbon up to 30 minutes empty bed contact time and 3 months regeneration.

   c. GAC is not universally feasible due to water quality conditions.

   d. Membranes may not be BAT due to lack of full-scale experience.

2. Alternate oxidants:

   a. Assuming MCLG values are met for disinfectants.

   b. Chlorine dioxide and chlorite residue removal and chloramines.

   c. Ozone plus chloramines.

   d. TTHM MCL of 25 ug/l is lowest that allows continued use of free chlorine.

3. By-product removal:

   a. Aeration (maybe for some).

   b. GAC adsorption (not for most chlorination by-products; ozone unknown).

   c. Reducing agents for MX, total oxidizing substances, possibly chloropicrin and cynaogen chloride.

   d. Reducing agents or free chlorine for hydrogen peroxide.

   e. Bromate and iodate — uncertain.

   f. Caveat ozone use with possible future need for post-GAC treatment for controlling AOC or removal of other by-products by adsorption.

E) Lead options are:

1. MCLs for TTHMs of 50 ug/L or 25 ug/L.

2. Other MCLs based on analyses of feasibility similar to TTHMs.

Table 19
Monitoring Requirements

Treatment Process	Monitoring Parameters	
Chlorination	TTHMs Haloacetic Acids Total Organic Halides (?) Total Chlorine Residual	Chloropicrin (?) Cyanogen Chloride (?) Total Oxidizing Substances (?)
Chloramination	TTHMs (?) Chloropicrin (?)	Cyanogen Chloride (?) Total Chloramine Residual (?)
Chlorine Dioxide	Chlorite Chlorine Dioxide (?)	Total Oxidizing Substances (?) Chlorate
Ozonation	Formaldehyde (?) Iodate (?) Hydrogen Peroxide (?)	Bromate (?) Total Oxidizing Substances (?)

Table 20
Summary of
National Primary Drinking Water Regulations
(as of May 1990)

Contaminant	MCLG[1]	MCL[1]
Microbiological Contaminants		
Coliforms (total)	0	1/100 ml[2]
Giardia Lamblia	0	TT[3]
HPC	—	TT[3]
Legionella	0	TT[3]
Virus	0	TT[3]
Turbidity	—	1-5 NTU[4]
Inorganic Contaminants		
Arsenic	—	0.05
Barium	—	1
Cadmium	—	0.010
Chromium	—	0.05
Fluoride	4.0	4.0
Lead	—	0.05
Mercury	—	0.002
Nitrate	—	10
Selenium	—	0.01
Silver	—	0.05

1 In milligrams per liter (mg/l) unless otherwise noted.
2 Revised regulations will be based on presence/absence concept rather than an estimate of coliform density: effective December 1990.
3 TT-Treatment Technique requirements established in lieu of MCLs: effective beginning December 1990.
4 Revised regulations will establish treatment technique requirements rather than an MCL for turbidity: effective beginning December 1990.

Cont'd on Next Page

Table 20 Cont'd

Contaminant	MCLG[1]	MCL[1]
Organic Contaminants		
2,4-D	—	0.1
Endrin	—	0.0002
Lindane	—	0.004
Methoxychlor	—	0.1
2,4,5-TP Silvex	—	0.01
Benzene	0	0.005
Carbon tetrachloride	0	0.005
P-Dichlorobenzene	0.075	0.075
1,2-Dichloroethane	0	0.005
1,1-Dichloroethylene	0.007	0.007
1,1,1-Trichloroethane	0.20	0.20
Trichloroethylene	0	0.005
Vinyl chloride	0	0.002
Total trihalomethanes (Chloroform, Bromoform, Bromodichloromethane, Dibromochloromethane)	—	0.10
Radionuclides		
Gross alpha particle activity	—	15 pCi/l
Gross beta particle activity	—	4 mrem/yr
Radium 226 and 228 (total)	—	5 pCi/l

NATIONAL SECONDARY DRINKING WATER REGULATIONS

➢ Secondary Maximum Contaminant Levels (SMCLs) are Federally non-enforceable and establish limits for contaminants in drinking water which may affect the aesthetic qualities and the public's acceptance of drinking water (e.g. taste and odor).

Table 21
SMCLs

Contaminant	Level
chloride	250 mg/l
color	15 color units
copper	1 mg/l
corrosivity	non-corrosive
fluoride	2.0 mg/l
foaming agents	0.5 mg/l
iron	0.3 mg/l
manganese	0.05 mg/l
odor	3 threshold odor number
pH	6.5-8.5
sulfate	250 mg/l
total dissolved solids (TDS)	500 mg/l
zinc	5 mg/l

➢ These levels represent reasonable goals for drinking water quality. The states may establish higher or lower levels, which may be appropriate dependent upon local conditions such as unavailability of alternate source waters or other compelling factors, and public health and welfare not being adversely affected.

➢ It is recommended that systems monitor for these contaminants every three years. More frequent monitoring for contaminants such as pH, color, odor or others may be appropriate under certain circumstances.

➢ Nine SMCLs were proposed with the 38 inorganic and synthetic organic chemicals on May 22, 1989 (see page 33). Other secondary regulations may be proposed in the future, as appropriate.